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ABSTRACT

This report on technology in education has been prepared, primarily for TVOntario staff, to highlight new and growing educational applications and to summarize recent evaluations of earlier application efforts. The descriptions of trends and developments are classified by media format. Representative applications of the media include: (1) television (use of telecourses and educational programming for adults, introduction of media literacy courses, and an increasing number of television game shows for children); (2) satellite delivery (more use of satellite transmission to deliver professional and continuing education programs and academic resources); (3) teleconferencing (as a communications medium for business, as a delivery medium for medical consultation and training, and as a forum for student exchange); (4) computers (computer-based learning environments, database access, and conferencing capabilities); (5) videodisk and interactive video (for training resource provision and for teaching reading); and (6) videotex (for banking, shopping, and financial planning services). (GL)

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TECHNOLOGY IN EDUCATION 1988

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April 1988

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TVOntario

Planning and Development Research
Planification et recherche en développement

Working Paper 88-2

TECHNOLOGY IN EDUCATION 1988

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SUMMARY

This report describes a number of trends and developments in the use of technology in education.

Television

- Growing use of telecourses and educational programming for adults in Canada, the United States, and Britain.
- Introduction of Media Literacy courses in Ontario high schools.
- An increasing number of television game shows for children.

Satellite Delivery

- More use of satellite transmission as a means for delivering professional and continuing education programs and academic resources in the U.S.
- Introduction of a Nordic service in Sweden and Norway in 1988.
- Growing use of satellite transmission to offer professional and teaching resources in Indonesia.

Teleconferencing

- Increasing use of teleconferencing:
    - As a communications medium for business in the U.S.;
    - As a delivery means for medical consultation and training in remote communities and developing countries; and
    - As a forum for student exchange between the U.S. and the Soviet Union.

Computers

- A computer-based learning environment is being designed to help students learn how to learn and how to organize and monitor learning.
- Efforts continue to develop computer-assisted learning and computer-rich environments.

- Educational computer communications services that offer access to data and mail or conferencing capabilities are being developed to some extent in Canada and more extensively in the U.S.

Videodisc/Interactive Video

- A sizeable project is planned to develop videodisc resources for Canadian studies in the 1990s.
- Growing use of videodiscs in providing training resources is reported in the U.S. and is expected in Europe.
- A videodisc-based literacy lab for teaching reading and writing has been prepared by IBM.
- In the U.K. considerable research and development of videodiscs for use in schools is underway.

Videotex

- Two competing interactive household telecommunications services (with banking, shopping, and financial planning services) are planned to begin in Montreal in 1988.
- Similar services are being introduced in the U.S.

TECHNOLOGY IN EDUCATION 1988

INTRODUCTION

This series of reports on Technology in Education is prepared by Planning and Development Research to highlight new and growing educational applications and to summarize recent evaluation of earlier efforts. While this second report in the series follows the first by six months, we are now planning to issue annual updates.

Assigning entries to particular sections in this report is becoming somewhat arbitrary as the transparency and integration of the technologies increase.

Since this report is prepared primarily for use by staff within TVOntario, descriptions of TVOntario activities are not included. Possible implications of the information presented for TVOntario activity in the future can be seen throughout the report, but four areas seem of particular interest:

- The communications benefits are now the focus in many of the distance education initiatives described, whether they are based on or enhanced by broadcast/cable/satellite television, teleconferencing, or computer conferencing. Increasing use is being made of all these technologies to reach more people, both those living far from existing educational programs, and those looking for new ways to upgrade their previous accomplishments. Opportunities for active involvement and interaction in adult education are seen in the growing use of live broadcast, audio teleconferencing, and computer conferencing.

- Both for distant learners and for students in schools, new projects are encouraging an awareness of learning how to learn, as well as an active personal involvement in learning. In some cases, these projects are using television and computers for assistance and support.

- Extensive services are being developed to provide students and staff in educational settings with electronic access to people and information. While it is clear that the developments are growing, there is still considerable uncertainty about the ways and the extent to which they will be used and about which facilities will prove worthwhile in the future.

- Efforts to establish a place for videotex services in the home are continuing. If such a system is widely accepted in the future, the potential for two-way communications with people at home may offer a useful adjunct to educational broadcasting.

TELEVISION

Canada

The Knowledge Network, B.C.'s educational broadcast television service, has entered into a new relationship with the Open Learning University and Open Learning College to form the Open Learning Agency. As a result of this cooperative effort, it is now possible to gain a Bachelor's degree in British Columbia without attending a campus. Along with general interest courses, Knowledge Network is broadcasting 63 telecourses, that is, credit courses sponsored by participating colleges and universities.

The Open Learning Agency reports growing use of audio conferencing as a supplement to telecourse broadcast and print material. OLA reports that now most of the University of Victoria's courses and half of University of British Columbia's courses include audio conferencing. The rapid increase in this application began about two years ago when universities started to buy higher quality pre-packaged telecourses to replace live broadcasts and began to use audio conferencing to replace phone-in segments. Audio conferencing allowed for higher quality broadcast programmes without the loss of interactivity. (Interview with Betty Mitchell, Knowledge Network, February 1988.)

In Alberta, ACCESS continues to broadcast 11 telecourses in cooperation with post-secondary institutions. Most of the telecourses are followed by audio conferences convened by the sponsoring institution. These activities are now taking place mainly during evening prime-time hours using American programming. To meet CRTC Canadian content regulations, ACCESS may have to reschedule the telecourses to times less convenient for learners. Their stable levels of viewership and participation in teleconferencing may decline with such shifts. Working with Athabasca University's new Distance Learning Development Centre, ACCESS will be involved in establishing new types of educational communications systems. (Interview with Margaret Meade, ACCESS Alberta, February 1988.)

C.A.N.A.L. (Corporation pour l'avancement de nouvelles applications des langages), Quebec's educational television service, began 24-hour, seven-day-a-week broadcasts across Quebec in September 1987. C.A.N.A.L. is carried by cable television to about 900,000 subscribers in 32 Quebec cities. The channel carries educational programming and courses developed and produced by the 13 members that operate the C.A.N.A.L.

consortium. These include Hydro-Québec, the Provincial Education Department and the Universities of Laval, Laurentian, Montréal, Sherbrooke, Québec, Québec à Montréal, Québec à Trois-Rivières, the Ecole nationale d'administration publique, l'Institut Armand-Frappier, and Télé-université. (CAUCE Bulletin, October 1987.)

"Literacy and Broadcasting" is the 1988 theme for the Canadian Association of Broadcasters' (CAB) committee responsible for social issues. As they note, Ontario's Ministry of Education is the first in Canada to introduce a mandatory media literacy programme as part of the English curriculum for Grades 7 through 12. Media literacy courses seek to develop critical thinking and decoding skills such as the ability to separate fact from claim, distinguish fantasy from reality, detect bias and assumptions, assess the strength of an argument, and determine the accuracy of a source. The CAB is encouraging broadcasters to support and assist media literacy programmes by providing pamphlets and speakers to describe their work, by making their own productions available to teachers and students, and by providing coverage of media literacy programmes.

Although Ontario is first in Canada to introduce a media literacy component in English classes, such a programme has been in operation in Australia for a couple of years. In addition, a two-year elective course for Grades 9 and 10 offers in-depth study of the mass media, exploring development, production, and impact of print, photography, cinema, radio, television, popular music, culture, and comics. (Information from Catherine Allman, TVOntario, and Barry Duncan, Association for Media Literacy, March 1988.)

The United States

Mattel has stopped production of new episodes of "Captain Power," the first attempt at interactive television using specially designed electronic toys at home to strike targets in the programme. Although television audiences were sizeable, sales of Mattel's interactive guns, spaceships, and robots were too low to recover the $15 to $20 million cost of the first 22 episodes (produced in Toronto by Ventura Pictures). The shows are expected to continue being aired in the 26 countries now showing them. (Toronto Star, 10 March 1988.)

In response to shrinking audiences for animated children's shows, game shows for kids are appearing on several channels. NBC's "I'm Telling," modelled on "The Newlywed Game," gets brothers and sisters to tell secrets about each other. Winners

are sent to the 'Pick a Prize Arcade' to grab as much as they can before the clock runs out. Nickleodeon's "Double Dare," "Finders Keepers," and "Zap Trap," Lorimar Telepicture's "Fun House," and Ken Hakuta's "The Dr. Fad Show," offer similar approaches to attracting young viewers and promoting products. (Newsweek, 28 March 1988.)

Public television reports record levels of viewership and member support in the 1986-87 season. From October 1986 through September 1987, public television averaged 96.8 million viewers per week, an increase of four million over the previous television season. Over the course of an average week, 56.6% of America's households were tuned in to public television--33.9% during prime time. Viewer support was also generous. According to PBS, viewer dollars account for 33% of public television funding, the largest single source of support. (ETV Newsletter, 4 January 1988.)

In the United States, broadcast television is being used more widely in adult education for several purposes:

- To make adults aware of new needs for continuous learning;
- To recruit new learners to upgrading and retraining;
- To instruct in many areas--basic skills (General Equivalency Diploma on TV), learning how to learn, small business and supervisory skills, as well as technical skills.

This is being accomplished through public service announcements, general interest programming that has issues of literacy or lifelong learning incorporated into it, and broadcast of telecourses.

The PROJECT PLUS literacy campaign, co-sponsored by ABC and PBS, has been remarkably successful over the last two years in building awareness of the need for adult basic education programs. ABC and PBS are committed to at least two more years of Public Service Announcements and literacy theme programming built into their offerings. Youth and literacy will be a focus in 1988. Ninety-four percent of PBS stations across the U.S. are involved in the PLUS initiative. (AAACE Conference, Washington, D.C., October 1987.)

In a recent survey by the National Association of Public Television stations, directors said that community outreach efforts like PLUS are the second highest five-year improvement priority after local programming. (CPB Report, 7 September 1987.)

The Learning Channel, an American national cable service available to more than 11 million homes (some in Canada) and offering a wide variety (70 courses) of educational programming for adults, will commit $2.1 million in an aggressive marketing campaign to attract subscribers and increase viewership. The Learning Channel has also committed to a goal of helping one million high school dropouts earn their equivalency degrees over the next five years. The network carries the General Equivalency Diploma series in prime time on weekdays. (ETV Newsletter, 21 December and 18 January 1988.)

The Adult Learning Service of the Public Broadcasting Service has reported an increase of 6,000 students over Fall 1986 in its Fall 1987 enrollment of 99,400 students.

The broadcast of Annenberg/Corporation for Public Broadcasting Project telecourses on public television stations and their distribution by the PBS Adult Learning Service will now be complemented by broadcast of these courses on some 50 Jones Intercable channels in 23 states. (CPB Report, 14 December 1987.)

A needs assessment to determine new telecourse development is now being conducted by the Instructional Telecommunications Consortium. This study, consisting of focus groups and a survey, has been funded by the Annenberg Foundation. The study is being conducted by Southern California Consortium for Community College Television. Approximately 18 Canadian institutions provided input to the study. (Interview with Mike Reddington, Knowledge Network, February 1988.)

PBS National Narrowcast Service continues to grow, aiming now to increase membership of corporate networks. In the next year, up to eight one-way video, two-way audio conferences on issues of corporate training and policy will be offered. A conference planned for May on "AIDS as a Matter of Corporate Policy," is expected to draw between 5,000 and 6,000 participants at 35 to 50 sites. The PBS Service needs a minimum base of 300 customers purchasing an average of $2,000 of off-air licenses annually to become self-supporting. This target could be reached as early as July 1988. (Interview with Charles Gianelli, National Narrowcast Service, March 1988, and ETV Newsletter, 9 November 1987.)

The United Kingdom

In the U.K., as in the U.S., several new initiatives are underway to build awareness, recruit learners, and instruct in specific skill areas. Lifelong learning is being promoted by

public and independent television broadcasts which are aimed specifically at the issue of learning. Television is also being used to recruit students to vocational training, as well as to support students wishing to continue their vocational education.

Channel 4 is playing a major role in the initiatives of U.K.'s Open College. It provides one hour of air time (1:00 p.m. to 2:00 p.m.) five days per week. This time has been chosen to reach the College's main target audience: people at work who can use their lunch hours to view or discuss programmes; those who are unemployed; and colleges which can either view 'live' or copy off-air for later use. Mondays feature a live programme for learners and potential learners designed to attract people to the Open College, alert them to new learning opportunities, preview new material, and help people with study skills. On Fridays, another live programme provides an opportunity for tutors, trainers, and other mediators to review progress and preview material, as well as themselves engage in their own training. Phone-in and follow-up facilities are arranged to accompany live programming. Tuesdays concentrate on basic skills and competencies; Wednesdays on personal skills and services; and Thursdays on the area of interest to industry and business. Open College pays all production costs of its series. Students may then purchase training packages from the Open College, which are a combination of video, audio, and print.

It is unlikely that most courses will be repeated on TV several years running. The strategy is to transmit programmes two or three times--once as a preview for tutors and trainers, and then again for learners. These transmissions should allow everyone who wants to the chance to copy off-air. The exception will be for courses for the most disadvantaged, who may not have access either to a college or VCR and are therefore solely dependent on broadcasts. (ETV Newsletter, 23 November 1987 and Airwaves, Summer 1987.)

This Spring the BBC will begin broadcasting a series called "In the Know," designed to help people of all ages learn more successfully and enjoyably. The series is designed to help those enrolled in formal and distance education, as well as those who want to learn more about their hobbies, general interests, work, and household skills. The programmes emphasize the advantages that learners gain from managing and directing their learning, and the value of mutual support with other learners. Print support materials accompany the series, which has been developed in collaboration with Open College.

In addition, the BBC is continuing its broadcast of "The Education Show," which covers issues relating to all aspects of education--from preschool to adult education; the implications of policy changes or curriculum changes; as well as applied information such as study skills. (BBC Education, Spring 1988.)

VSATs in Canadian Business

The use of VSATs (Very Small Aperture Terminals) for business communications is expected to increase this year as Canadian Satellite Communications, Inc.'s SATLINK/VSAT and Telesat Canada's Anikom 200 are made available to the public. The proposed rates for selling the dishes are $20,000 per location, or leasing them for three years at $550 per month. VSATs are considered appropriate for businesses with communication costs of over $1,000 per month. The VSATs' strengths are the quality of the data transmission, the reliability of the technology, the distance-insensitive cost of the delivery of information, and the possibility for the reception of full-motion video. The difficulty is that the time lag, as the data travels from transmitter to satellite to receiver, can be awkward for voice communications. Competing technologies, such as fibre optics and the Integrated Service Digital Network, may prove less costly and more flexible than VSATs. (Office Management and Automation, January 1988.)

Satellite Delivery in the U.S.

The use of satellites, mostly direct broadcast satellite, for professional and continuing education is growing in the U.S. The trend hasn't developed as extensively in Canada as yet.

A direct broadcast satellite (DBS) network, scheduled for launch in the U.S. in 1990, will provide one television channel for educational and public service use 24 hours per day. The satellite capacity will be made available through Advanced Communications Carrier (ACC) for secondary schools, adult continuing education through hospitals, universities, and colleges, as well as professional development by teachers and school administrators. The Public Service Satellite Consortium will be responsible for acquiring programs and managing the network. The growth in private satellite networks for professional and continuing education has encouraged the development of this network, named YES, or Your Education Service. The work in the next year involves the solicitation of adequate user support to warrant the development of the service. (TechTrends, September 1987.)

The National Technological University (NTU) has now expanded to include 24 U.S. universities and over 150 courses for Master's degrees in advanced technology and engineering. The courses are

delivered nationwide, by narrowband satellite transmission to work sites throughout the U.S. The participating universities supply all the course materials as the NTU has no campus or faculty. (TechTrends, September 1987.)

The U.S. Department of Education has provided a grant to the TI-IN, a private satellite network devoted to transmitting academic resources, for a "School of the Air" programme called "Math Magnet." The courses are designed for highly capable high school math students. The programming is live and interactive, using satellite broadcast, telephones, and word processing technology that allows the instructor to distribute handouts, tests, and assignments in seconds. As well, each student has an electronic writing tablet so that problems can be worked on in the group and the teacher can mark and provide feedback as the work progresses. Tests will be conducted through computer and results will be available in minutes. The courses offered would not be available to the students through any other means. (TechTrends, September 1987.)

One of the latest applications of satellite technology, although hardly educational, is noteworthy. Soon, Americans will be able to play satellite Bingo--a weekly half-hour programme at a production cost of $25,000, with up to $50,000 in prizes per show. The first verified 'bingo' to telephone wins all. (DBS News, Sepember 1987.)

Satellite Broadcasting in Sweden and Norway

Recent Swedish studies have looked at the influence of satellite delivery to foreign television on viewing patterns. The access to satellite is still tiny at only 5% of the population. However, 46% of these households watch one or more satellite channels daily, while 82% watch Swedish TV. Research done in the highly-cabled areas shows that cabled viewers spend 16% less time with Swedish channels than do viewers on the whole.

Selections in viewing favour fiction and music, perhaps reflecting the availability of Sky Channel and Music Box from the U.K., and the French TV5. The most satellite channel viewing is found among nine to 24 year-olds, which most likely reflects the level of foreign language comprehension. The research also showed a new form of media consumption--TV listening--40% of satellite viewers report listening to TV without watching it. As Sweden considers itself one of the most vulnerable countries to the intrusion of foreign programming, the trends in these viewing patterns will be interesting to watch.

The Swedish and Norwegian Telecommunications Authorities will launch their own satellite Tele-X in 1988 to broadcast Nordic television. A projection of the numbers of people in the Nordic countries who might be able and willing to watch Nordic television to 1990 indicated an expectation of an average of only five minutes of daily exposure. This estimate is expected to shrink with increasing competition from other satellite channels. (Audience and Programme Research, November 1987.)

Indonesia To Expand Distance Education

Sisdiksat, the Distance Education Satellite System, is designed to maximize the scarce professional and teaching resources of the Eastern Islands Universities Association in Indonesia. The programme is one of the original applicants for utilization of the Palapa system. Under a loan proposal to the World Bank, the successful distance education programme for the eastern islands may be expanded to the western islands.

Sisdiksat initially received a significant portion of its funding from the U.S. Agency for International Development through its rural satellite programme. However, Indonesia's Ministry of Education now funds the programme without assistance from USAID, which is particularly notable since the country is going through a period of budget reductions.

It is no surprise that Sisdiksat has support in the country since nearly 13,000 people have benefitted from its programmes and services. The system links 12 remote universities and a handful of government agencies spread over 900,000 square miles; it is believed to be the largest teleconference network in the developing world.

The interactive communications system utilizes the dedicated voice channels on the Palapa satellite and a four-wire ground telephone system. Sisdiksat electronic classrooms consist of an audio conferencing channel for two-way voice communications. A second channel is used for a variety of purposes, such as graphics and hard-copy transfers, and redundant capacity. Each Sisdiksat classroom accommodates 40 to 80 students. In a survey of the students, 74% said they learned from the discussions, and 67% said they learned as much or more from the distance courses as from their regular courses.

The Sisdiksat system holds promise for what might be done throughout the developing world. Expansion to the western islands may be just the beginning. (Satellite Communications, January 1988.)

TELECONFERENCING

In December 1987, Sheridan College, Oakville, coproduced a video conference involving 32 Canadian sites and 150 American sites. The conference presented four case studies on how video conferencing is used in academic instruction and in on-the-job training. The event was sponsored by the National University Teleconference Network (NUTN), which is a consortium of higher educational institutions linked across North America to share non-credit educational and training programmes delivered via satellite. It would seem that video conferencing is gaining wide utilization in U.S. business for new product information and staff training.

While NUTN regularly schedules teleconferences on a wide range of topics, member institutions are not obliged to sign on for all of them. Sheridan College acts as broker for NUTN, offering their conferences to other institutions and interested groups. Sheridan's long-term plan is to produce its own video conference targeted at the computer graphics industry. (Canadian Communications Report, 31 January 1988, and Interview with Peter Mallett, Dean of Distance Education, Sheridan College, March 1988.)

Communications Canada and Le Centre hospitalier de l'Université Laval International Inc. (CHUL) have signed a Memorandum of Understanding establishing a framework for joint research in telemedicine. The aim of this agreement is to develop new applications for telemedicine, distance learning via radio, telephone, and satellite, and to improve medical training in developing countries through telecommunications. (Communications Canada News Release, 3 December 1987.)

U.S. and Soviet students participated in three interactive teleconferences (12, 26 February and 11 March 1988) in an effort to explore the similarities and differences between the two cultures. The first two teleconferences featured Soviet youth interviewed on videotape and live commentary from in-studio presenters familiar with life in the Soviet Union. The third teleconference features a live satellite link between the U.S. and the U.S.S.R. which enabled students in both countries to talk directly to one another. The programmes were designed for Grades 7 and 12 and extensive ancillary materials have been developed. The teleconferences were offered to PBS stations for either live or tape-delivered broadcast to schools in their viewing areas. (ETV Newsletter, 4 January 1988.)

Computers in Canadian Education

A group led by Marlene Scardamalia and Carl Bereiter at the Ontario Institute for Studies in Education is developing a computer-based learning environment designed to help students learn how to learn and how to use strategies that encourage understanding, self-monitoring, and organization of knowledge. This Computer Supported Intentional Learning Environment (CSILE) provides a means for a group of students to build a collective knowledge-base or database of their thoughts (in the form of pictures and written notes) on any subject assigned by the teacher or selected by the students. This project represents a unique approach to using computers in the learning process. A related project to this is being conducted in Illinois by Ann Brown, a leader in the field of metacognition. Brown is developing similar classroom strategies without the use of computers. (Interview with Marlene Scardamalia, Ontario Institute for Studies in Education, March 1988.)

Under a cooperative agreement between North Island College, B.C., and the software producer, Softwords, a full-year university level introductory course in computer science was designed and delivered primarily via computer. Using Natal, Softwords produced a total of 300 hours of courseware, now called BLAZE, that teaches Pascal programming and data structures. Developing the first semester component required approximately 45,000 hours of work; the second semester took somewhat less with the development of improved course writing tools.

Given the mastery learning approach taken, the course was very demanding and time consuming to complete. Of the 130 B.C. students who began the course, 25 completed it and received credit. Now there are 10 to 15 students taking the course at any one time. (The Computer Journal, Vol.30, No.5, 1987.)

BLAZE has also been used in China by English speaking students using ICON equipment. Nine students of modern educational technology and nine junior students of computer science found BLAZE and the ICONET network system successful in teaching Pascal. The individual pacing and the mastery learning approach were seen as valuable in allowing all 18 students to earn grades over 90%. Students on average spent 5.7 hours per week using BLAZE and 3.4 hours reading and doing other assignments. This was less time than students spent on any other course.

Despite students' considerable English knowledge, language difficulties accounted for 12% of mistakes. The report hopes that ICONETS with Chinese characters will become available. (Softwords, a report on ICONET computer system and BLAZE software.)

A $14 million project to develop the use of computers, telecommunications, and broadcast technologies in distance learning has been announced by Athabasca University in Alberta. The Distance Learning Development Center (DLDC) is a consortium made up of the University, AT&T Canada, Alberta Government Telephones (AGT), the ACCESS educational network, the Alberta Department of Advanced Education and the Department of Technology, Research and Telecommunications.

Initially, DLDC has proposed 20 projects. Among them: a computer-assisted learning writing skills program; the development of a low-cost, interactive teaching module for distance education; a test program to evaluate VSAT technology for use in distance education; and the production of a student information system package which could be sold to other educational institutions. (Canadian Communications Reports, 15 December 1987.)

Computers in American Schools

The percentage of U.S. public schools using microcomputers in the classroom rose from 18.2% in 1981 to 92.2% in 1985. However, access to microcomputers is relatively limited for students in poorer or rural schools. The amount of training teachers receive in computer use is increasing, but has also been related directly to the wealth of the district they are in. Help with equalizing access to computers and teacher training was sought from the U.S. government, but a proposal for spending $150 million on computer hardware, software, and teacher training was cut back to under $10 million. (Electronic Learning, October 1987, and Datamation, 15 December 1987.)

All 180 Grade 7 students at E.O. Green Junior High School in Port Hueneme, California go to the SmartClassroom to learn science. An interactive computer network connects the teacher with students in the classroom or in their homes, via the school's microwave dish, which also brings in weather data for student use. A laserdisc-based interactive retrieval system for problem solving activities, an encyclopedia on compact disc, personal computers recessed into desk tops, video games, a full-colour video projection system, cable and satellite television systems, and a robot are all part of what is described

as a fully integrated, computerized curriculum. Most assignments and all student work and tests are given, completed, and graded by computer. The project is funded in part by the California State Lottery and assisted by the General Telephone Company of California. The school superintendent believes that similar developments will follow in other district classrooms and other curricula. (TechTrends, November 1987.)

Computer Communications in Canada

The Ontario Ministry of Education's field trial at TVOntario, called the Electronic Data Access Network (EDAN), has taken a unique approach by offering conferencing among school and board sites with no database access component. Most of the other computer communications services appearing in many areas throughout North America are emphasizing access to varying kinds of databases, often adding interactive communications features as a second type of use.

Quebec, Saskatchewan, Alberta, and British Columbia have all undertaken some school-related computer communications activities. In Quebec, the Ministry of Education has invested $3 million to establish the Societé de gestion du reseau informatique des commissions scolaire (GRICS), a decentralized private province-wide datapac network for educational use by school boards and CEGEPS. Beginning in 1983, GRICS began distributing curriculum documents and offering assistance with scheduling, transportation, payroll, and other administrative services. Access to databases (both GRICS databases and commercial services), software, teaching materials, teacher training materials, and support services have been added and electronic mail capabilities are available. Having installed this infrastructure, GRICS is now working to encourage its use. The Ministry has designated some colleges and school boards as sites that receive one link free, but most users have to pay user fees. Additional communication costs are involved for schools located far from one of the 150 concentrator sites. (Converation with Marcel Ouellette, GRICS, April 1988.)

In Saskatchewan, bulletin board and electronic mail capabilities are available. The main educational use involves access to a student guidance information system being used by several high schools and community colleges. In Alberta, 30 of 125 school boards and a small, but growing, number of schools are connected to the Electronic Network bulletin board which distributes Alberta Education information including lists of approved and pending software. No plans are being made to introduce conferencing although the University of Alberta

computer that hosts the system has such capabilities. (Conversations with Gerry Trefani, Alberta Education, and Greg Thomas, Saskatchewan Education.)

In 1987, Knowledge Network in British Columbia conducted a pilot project in 72 schools designed to assess the potential use of databases and of communications and conferencing features. While the potential use of such capabilities could be seen, the difficulties and costs involved were great and the pilot was not extended. (Conversation with Betty Mitchell, Knowledge Network, March 1988.)

Also in British Columbia, the Faculty of Education at Simon Fraser University is continuing to offer teachers free access to its computer facilities and more recently has been selling membership to its Exchange Network for education. In the three months since the Exchange Network has been available, 200 members have paid the $25 fee. Both users and subscribers have been involved in a variety of activities--accessing databases (the CD-ROM versions of ERIC and Groliers Encyclopedia); Student Forum and School-to-School projects involving pen pal messaging; French language activities; and ask-an-expert conferences. Teacher training programs are also using the system for tutoring assistance for trainees and some direct instruction.

A critical mass of use seems to be developing, but access has been free and datapac charges paid by the university have quadrupled in the past year. It remains to be seen whether the communications benefits are considered sufficiently valuable to support some sort of user pay system. (Conversation with David Bell, Simon Fraser University, April 1988.)

Computer Communications in American Schools

In the U.S., a variety of user pay computer communications services have been established in the past few years. Thus far, little information is available describing teachers' or students' experience with the system, or assessing the amount, value, or overall costs of system use.

The Learning Link, established by WNET, a New York PBS station, has expanded its online service for educators. Originally providing information about PBS programming, it now offers information relating programs to curriculum. An additional service allows teachers to message with each other via computer message centres called "forums" which focus on particular series or concerns. About 500 school districts

(paying $140 per school), involving 900 registered members, have subscribed to use the services' eight incoming lines. (Electronic Learning, November/December 1987.)

Similar computer communications services now available include EDISON (Educational Information Services On Line), operated by the Central Educational Network in Illinois, the McGraw-Hill Information Exchange (MIX), Dialog Information Service's Classroom Instruction Program, Einstein offered by Addison Wesley, and the PBS/Instructor service. (Electronic Learning, November/December 1987, and TechTrends, November 1987.)

Although government funding for literacy programs in the United States is low, a combination of public and private sector funds were involved in establishing a nation-wide database on literacy available via SpecialNet. Through LitLine, subscribers can access descriptions and purchasing information about a variety of print materials and software for teaching literacy. They can also search information about federal and state government activities, private sector programs, and names of LitLine members working in the field. All subscribers pay a $25 (U.S.) setup charge plus user fees. (Promotional Material from LitLine.)

Computer Conferencing in Canadian Post-Secondary Education

A study on the use of electronic mail was undertaken in 16 post-secondary institutions in Atlantic Canada under conditions thought to be typical for continued work in the future, using both Netnorth/Bitnet and the CDNnet network. The final report, completed in February 1987, found that the volume of network use for communications among faculty or for administrative tasks did not change appreciably between January and October 1986 and did not match the participants' expectations. Inadequacies mentioned were training, documentation, ongoing technical assistance, central directory services, and equitable access. (Media in Education and Development, September 1987.)

The Extended Campus Program (ECP) at the University of Alberta uses electronic communications to provide support services for students who are taking their Masters of Education degree while continuing their employment in locations remote from the central Edmonton campus. Rather than removing the residency requirement, (as has been done in other universities), this program was set up to provide valuable contact with professors and students, as well as access to library materials using computer communications. Minimal on-campus attendance is necessary. Based on positive student

response in both internal and external evaluations, the program has been extended for a further five years. (Canadian Journal of Educational Communication, Summer 1987.)

In May 1988, the Open Learning Agency in British Columbia will begin a Discovery Training Network that offers access to a database describing all training and post-secondary education programs in the province. Information about courses or program requirements, locations, topics covered, scheduling, and instructors will be available initially from 18 terminal access points with printers in Canada Employment offices, Department of Labour offices, libraries, and community centres. By the Fall of 1988, there will be 100 access points in shopping centres as well as government offices and community sites. It is hoped that eventually a variety of computer-based training programs will also be available for downloading for one-time use.

The delivery system software being used in this project has been licensed from Timeplace Inc. in Boston as a pilot project. The large listings of 150,000 U.S. courses and 25,000 independent learning materials have been made available for searching as well. (Conversation with Dale MacCrostie, Discovery Training Network, March 1988.)

The Open Learning Agency is also introducing OPLNet, a computer network linking colleges across the province. A variety of computer conferences are planned to allow instructors to share information on computer-based training and computer-managed learning aids, and to encourage instructors to work together on curriculum development and professional development activities. OPLNet will be using the CoSy conferencing system, but instead of installing one central system, OPLNet will involve independent CoSy systems in each college. Computers will be linked directly to their own CoSy software, rather than via modems and telephone lines to a distant site. Messages to other colleges or centres will be transmitted in batches. This is expected to keep communication costs to a minimum and encourage local use. Plans are being made to involve college student use, and future involvement of elementary and secondary schools is being considered as well. OPLNet will also be used by Open Learning Agency students and tutors as an alternative to telephone communications. (Conversation with Mike Battistel, Open Learning Agency, April 1988.)

VIDEODISC/INTERACTIVE VIDEO

At a meeting of experienced users and designers of interactive videodiscs, several issues and solutions for IV use were considered. The major issue was the high cost of development, with an average minimum figure of $50,000 per side for one to four hours of instructional time. The videodisc can be seen as cost-competitive only, with large numbers of learners and multiple sites. Manufacturers are working to reduce the proliferation of incompatible hardware--another crucial step for videodisc success. (Nebraska Videodisc Design/Production Group News, Autumn 1987.)

Jean Talon Project

Plans are being made to produce a series of bilingual interactive videodiscs that will portray all aspects of Canada in the 1990s. Named after Canada's first census taker, Jean Talon, the project will follow the example of BBC's Domesday project, which incorporates thousands of photographs, maps, statistics, landcover information, and visual displays showing life in Britain in 1986.

A Canadian editorial board will be responsible for achieving a good balance between the different subject areas and for devising a Canadian system for indexing and retrieving information. A major feature being planned is the inclusion of comprehensive map coverage with the ability to change from scale to scale and zoom in on areas of interest, possibly to the level of floor plans of special locations. Begun as a cooperative venture by Statistics Canada, the Canadian Studies section of the Secretary of State, and the Ontario Science Centre, the project network now involves over 40 representatives from private, university, school, and government organizations. (Information from Stan Squires, Ministry of Citizenship and Culture, April 1988.)

IBM's Alphabet Literacy System and InfoWindow System

IBM has developed a videodisc-based literacy lab called Principles of the Alphabet Literacy System. Students work on the IBM videodisc system to learn the relationship between sounds and letters, and between letters and words. They learn to touch-type on the micros in order to write their own sentences and stories. The material is presented in a cartoon format.

The system was tested in a Michigan school system in 1986-87. In the 20-week programme, youth recently out of school gained the most--three years of reading and writing skills, while the adult basic education groups, with a much lower completion rate, gained 1.75 years of reading and writing skills. The youth-in-school group had much lower gains and some actually lost skills. The evaluators felt that gains were made in the students' self-confidence and self-esteem. (T.H.E. Journal, September 1987.)

The Alphabet Literacy System uses the IBM InfoWindow System. The InfoWindow display allows touch-screen interaction with graphics material generated by the micro or stored on the 54,000 frame laserdisc. The equipment to support the Alphabet Literacy System costs $60,000 (U.S.) for schools, including four IBM PC-XTs, four videodisc players, four IBM InfoWindow touch-screen displays, eight IBM PC Juniors, and four IBM electronic typewriters. (Optical Information Systems, May-June 1987.)

By using InfoWindow, full-motion video, computer graphics, and audio and speech synthesis can be combined to create presentations for public information access, training, education, merchandising, and other graphics applications. The InfoWindow system itself costs $4,200 (U.S.). Introduced in 1987, it is expected to set an industry standard that will encourage the introduction of interactive video training into corporations.

The videodisc industry has needed a stabilizing influence to contain the proliferation of incompatible systems. Although no one system is expected to dominate, a review of the literature on current videodisc development indicates that IBM and Sony are becoming the standards for the training market. The standard for the huge U.S. military interactive video and computer-based training market is expected to be EIDS, Electronic Information Delivery System, developed by Matrox of Canada. (Videodisc Monitor, November 1987.)

Interactive Video in Training

Over 75,000 interactive videodisc systems will be sold in 1988 in the United States, totalling over $1.3 billion in expenditures according to a recently released market survey. Irvine, California-based SK&A Research estimates total costs for hardware expenditures alone to be worth $700 million, with associated video production, systems support, software, and courseware expenditures to add up to another $660 million.

Results of the study were based on a recent survey of 3,000 training companies, marketing organizations, consultants, video production companies, and systems integrators. Those respondents indicated that most of their business would be done in the manufacturing area over the next two-to-three years, followed by medical, financial, retail, and government sectors.

Applications for these 75,000 interactive videodisc systems were ranked in a similar fashion, with an overwhelming 80% of respondents selecting training as the most popular. Other applications, in order of priority, were point of information, point of purchase, exhibition, public access, archival, diagnostics, and system control. By 1992, the market prediction is $2.5 billion, equally divided between hardware and software. (Viewdata, November 1987.)

Similar results were found in a videodisc study done in Europe by a New York firm. Their report projects a growth rate of 25% for the European videodisc market, reaching $350 million in hardware by 1991. The most likely applications are in training and point-of-sale advertising. France, the U.K., and West Germany are seen as the largest markets. (Viewdata, December 1987.)

The auto industry has been active in developing videodiscs for training. In January 1988, Ford Motor Company will offer interactive systems to 6,000 U.S. dealers for training of service technicians. Twenty-six programmes on 17 discs have been developed to cover such topics as air-conditioning, carburation, transmissions, and electronic engine controls. Interactive Training Systems has completed the first of two discs for a $1 million-plus contract for the United Auto Workers/General Motors Health and Safety Committee's interactive video training programme. The discs will be used to train up to 500,000 employees in 194 plants. (Videodisc Monitor, July 1987 and November 1987.)

Interactive Video In U.K. Schools

In the U.K., an Interactive Video in Schools Project, funded by the Department of Trade and Industry, has been running since 1986. Eight interactive video programmes have been designed and developed for classroom use. The topics include: an ecology videodisc for primary and middle school science; an interactive video package for secondary school mathematics based on running a school disco; a videodisc produced in Northern Ireland on social and personal values education for 14-16 year-olds; a disc to assist young children to learn French; a disc on how the design process works; a teacher training

disc that emphasizes learning opportunities for children outside the classroom; and an environmental studies disc for teachers in Scotland. The interactive materials are integrated with the curriculum and are developed in video centres throughout the U.K. All these discs are developed for pilot studies and extensive formative evaluation is to be carried out by the Centre for Applied Research in Education at the University of East Anglia.

As this software has become available, trial and pilot testing have been taking place in 100 schools. Teaching strategies and support materials for use of IV are continually developed, modified, and tested. The packages themselves test different content and learning strategies for the use of interactive video. The project is defined as research and development to investigate the use of new technology; to understand its pedagogical strengths and weaknesses; to provide experience in its classroom management; and to ascertain the teacher supports needed for its best use.

This deliberate, nation-wide, and continuously researched approach to the introduction of a new technology has proven successful in the past for British education and industry. The project is now being administered by the National Interactive Video Centre in London. (Materials from NIVC, 1987.)

Canadian Services

Grassroots, a Canadian agricultural videotex service, serves farmers and agribusinesses in Ontario and the Prairies, providing the latest prices from commodity and livestock exchanges.

Grassroots was owned by Southam Communications, but in mid-1986, Southam decided to divest itself of enterprises of this type and several employees moved to take over the operation of the system. Grassroots went through a massive cost reduction programme that involved the layoff of 30 of the 36 staff. Research and development functions were halted, and the service reduced its attention to the presentation of graphics as opposed to text. The company now maintains approximately 2,000 subscribers (roughly the same number as subscribed to the service when it was operated by Southam). Grassroots is now described as being close to the break-even point. (Globe & Mail, 13 January 1988.)

Encouraged by the success of France's Minitel, two interactive household telecommunications services will soon be competing for Canadian customers. (In 1987, Minitel earned more than $200 million (U.S.) for the French post office that operates it, not including profits for the service providers.) Bell Canada's system, called Alex, will begin in Montreal in September 1988 and in Toronto in January 1990, and is expecting to attract 20,000 subscribers after two years, using an average of 50 minutes per month. Deliveries of the terminals produced by Northern Telecom in Mississauga are expected to begin in March. Unlike Minitel, Alex will use the NPLPS protocol developed from Canada's Telidon system.

Bell's strategy is to involve 20 key service providers, who will each be responsible for attracting and maintaining 1,000 subscribers. Initially the terminals will go to information providers who will set up home services--hopefully including banking, retail sales, travel information and booking, and financial analysis and brokerage. Air Canada and the National Bank of Canada have both been negotiating to sign on, and Provigo Inc. of Montreal is considering providing a home grocery shopping service. Subscribers will rent the terminal for $8 per month and for many services will also pay a user fee of between $8 and $15 for the first hour of on-line connect time. No 'messageries roses', the sex-related chat lines which account for almost one-third of Minitel's use in France, will be allowed on the Alex network. (Tim Barnett, Bell Canada, March 1988.)

However, two such chat services will be available on the system being introduced by Montreal-based CETI Inc., which will use the French Minitel communications protocol rather than NPLPS. (Apparently the two systems can be made compatible if the vendors agree.) CETI is bringing Minitel units in from N.V. Phillips of the Netherlands at the rate of 10,000 per month. The terminals will sell for $600 or will be available for a monthly rental fee of $25, including one hour of on-line connect time to the system. CETI has signed Caisses Populaires Desjardins of Quebec City to provide banking services and is negotiating with the Royal Bank of Canada, Disnat Investment Inc., and Lotto Quebec. U.S. Videotel, a Houston-based company, is about to launch the Minitel system in the United States. (Globe and Mail, 22 February 1988.)

American Services

A consortium led by Sears Roebuck and IBM, (and CBS until it withdrew from the project in 1986), is about to launch TRINTEX "PRODIGY," a comprehensive interactive computer service. Development cost is estimated at $250 million (U.S.). The service is designed to bring "demographically targetted advertising and information to home computers." The service will debut in Atlanta and San Francisco sometime in 1988.

A spokesperson described the service as, "less a traditional videotex offering than an interactive personal service." PRODIGY will offer its subscribers (at estimated fees of $10 to $20 per month) a host of services, including electronic mail, home shopping and banking, travel reservations, on-line securities trading, business services, and information services (such as USA Today and Dow Jones reports). In addition, the system will offer an "experts feature," where users send questions to and receive answers from experts in selected fields, educational features such as Encyclopedia Britannica, interactive trivia quizzes, and fiction games.

The primary target market for PRODIGY consists of upscale U.S. consumers who will value the time-saving features of the PRODIGY service. The system requires that subscribers' households contain an office-quality PC (probably with 256 kilobytes of memory) and a 1200 baud modem. (CHANNELS Field Guide 1988, and Viewtext, December 1987.)

GV-10 (originally conceived as the Guinness Videophone Educational Network) is yet another multi-purpose videotex service. This advertiser-supported system will include "a very sophisticated Yellow Pages," chat and conferencing capabilities, and a community news database. The system's trial

launch in Marin County, California, was delayed pending modification of the Northern Telecom Datephone II terminal unit (an enhanced phone complete with video screen and printer). In explaining the decision to delay the launch, system president, Larry Guinness, noted that: "If the box isn't right, people aren't going to try the cereal. Because the phone will be the user's only tangible interface to GV-10, the user will come to relate the quality of the phone with the quality of the service." (Viewtext, September 1987.)